

Registration of Slopes and Retaining Walls

The Geotechnical Engineering Office (GEO) maintains a Catalogue of Slopes which contains pertinent information on all sizable man-made slopes and retaining walls (collectively termed features) in Hong Kong. Each feature is given an individual registration number by GEO. The definition of different feature types is given in Appendix A. The criteria for registration and the types of non-registrable features are given in Appendix B.

2. A computerized Slope Information System (SIS) storing features data has been established and is being maintained by the GEO. Access to the SIS can be gained during office hours from a computer workstation in the Slope Safety Division of the GEO on 7/F., Civil Engineering Building, Homantin, Kowloon. The public and engineering professionals can also retrieve slope information from the Internet version of the SIS at the Hong Kong Slope Safety Website (<http://hkss.ced.gov.hk>).

3. To assist in updating this catalogue, Authorized Persons/Registered Structural Engineers (APs/RSEs) and their geotechnical consultants responsible for the site formation works and/or feature upgrading works for a private development are requested to provide information to the GEO on all completed permanent features formed or modified/partially modified or subject to changes in feature conditions and status within or adjacent to the development for which the development owners have maintenance responsibility. The information on maintenance responsibility of features can normally be obtained from the Slope Maintenance Responsibility Information Centre of the Lands Department on 1/F., North Point Government Offices, or from the Website (<http://www.slope.landsd.gov.hk/smris>). The responsibility for the maintenance of land adjacent to a development and outside the lot can be ascertained from the land title documents and clauses in the lease: e.g. cutting away clauses, green hatched black areas, etc.

4. The information requested is a **1:1000 site plan (with location plan)** showing the boundary of each feature, a **record sheet** providing basic data and photographs relating to the feature. A proforma for this information is attached at Appendix C and should be presented with the certificate of completion of the site formation works and/or feature upgrading works. The geotechnical consultant to the AP should be able to assist. A soft copy of the basic data should also be provided. The data structure is given in Appendix D. To facilitate data entry a standard database file is available for downloading in the Internet at the download area in the website of <http://hkss.ced.gov.hk>. A soft copy of the input database file is also available from the Slope Safety Division of the GEO (contact no. 2762 5255). If possible a digital copy of the photographs should also be provided.

5. The GEO will return to the APs/RSEs or their Geotechnical Consultants a copy of the 1:1000 plan indicating the registered numbers of the newly formed/modified features.

6. APs/RSEs and their geotechnical consultants should advise development owners of the registered feature numbers when providing them with details for maintenance of their features. This will help owners in keeping the necessary slope maintenance records. Development owners should also be advised to include such feature numbers in the Deed of Mutual Covenant.

(C M LEUNG)
Building Authority

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Appendices B & D amended

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Slopes and Retaining Walls – Registration

Feature Registration System

Registration Items	Practice to be Adopted
1. Feature Definitions	<p>F - Fill slope or platform with a surface sloping at $\geq 15^\circ$ and a minimum fill thickness of 1m and without any associated retaining wall(s).</p> <p>C - Cut slope without any associated retaining wall(s).</p> <p>R - All retaining walls supporting a slope or platform with a surface sloping at $<15^\circ$ (fill or natural ground). Where a series of retaining walls of less than registrable height are on an overall slope greater than 45°, their height should be combined to judge if they are registrable.</p> <p>CR - Cut slope with associated retaining wall(s) at crest, middle or toe of the slope.</p> <p>FR - Fill slope with associated retaining wall(s) at crest, middle or toe of the slope.</p> <p>DT - Disturbed terrain features which contain repairs to landslide scars or comprise a series of composite cut and/or fill slopes where the ground surface has been disturbed, the natural slope gradient is greater than 15° and although the individual slopes do not meet the height criteria for registration, the total height does meet the criteria for registration.</p>
2. Marking of Feature Boundary	<p>R - plan boundary of the wall</p> <p>F - boundary of the fill slope</p> <p>C - boundary of the cut slope</p> <p>FR - boundary of the fill slope and wall</p> <p>CR - boundary of the cut slope and wall</p> <p>DT - boundary of the disturbed terrain</p>

Criteria for Feature Registration

- (a) Cut slopes, including any associated retaining walls, and retaining walls greater than 3m high;
- (b) Fill slopes, including any associated retaining walls, greater than 5m high;
- (c) Fill slopes, including any associated retaining walls, less than 5m high which pose a direct risk to life, i.e. Consequence-to-life Category 1 or 2 in PNAP 234; and
- (d) Disturbed terrain features which contain repairs to landslide scars or comprise a series of composite cut and/or fill slopes where the ground surface has been disturbed, the natural slope gradient is greater than 15° and although the individual slopes do not meet the height criteria for registration, the total height does meet the criteria for registration.

Note:

1. Disturbed terrain features generally cover situations such as repairs to landslide scars, cemeteries, cleared squatter land and agricultural terraces (existing or now abandoned) where extensive modifications have been made to the ground surface.
2. A list of structures/features, which should not be registered in the Catalogue of Slopes, is given in the attached table.

Types of Non-Registrable Structures/Features

Structure/Feature Type	Definition
1. Seawalls/marine structures	The water-facing side of a coastal structure that retains soil or rock and is constructed of concrete, soil and/or rock.
2. Dams and other water retaining structures	All water retaining structures including dams and service reservoir walls maintained by private owners (e.g. Discovery Bay reservoir dam). (Fill embankments in front of service reservoirs or other water-retaining structures should be registered.)
3. Basement walls/ screen walls	Concrete walls that form part of a building and which are in direct contact with soil or rock, with the free air side facing into the building.
4. Tunnels/ shaft linings	Circular or other continuous concrete or steel walls or facings which are in direct contact with soil or rock. (Free standing tunnel portal slopes and retaining walls should be registered).
5. Culverts/covered nullahs	Underground waterways. (Free standing sidewalls of open nullahs/catchwater and river banks satisfying the registration criteria are considered as registrable features.)
6. Bridge abutments	The concrete/steel structure of a bridge that provides direct support to the span of a bridge deck. (Fill embankments and reinforced fill structures and slopes should be registered.)
7. All temporary features	Features under construction, e.g. temporary stock piles, quarry faces and controlled tips. (Abandoned quarry faces and completed controlled tips should be registered as cut and fill slopes respectively.)

Note: Walls which are designed and constructed monolithic with a building or structure will not be registered. APs/RSEs should advise the GEO of such walls if they have already been registered in the catalogue of slopes.

(Rev. 2/2002)

RECORD OF SLOPE/RETAINING WALL						(SHEET 1 OF 4)	
SLOPE/RETAINING WALL REFERENCE NO. ⁽¹⁾							
SLOPE/RETAINING WALL LOCATION (ADDRESS)							
MAP COORDINATES (1980 DATUM)				E N		TOE ELEVATION (mPD)	
TECHNICAL INFORMATION (Continue on separate sheets if necessary)							
SLOPE				RETAINING WALL			
Material Description				Type of Wall			
Height (m)				Height (m)			
Length (m)				Length (m)			
Slope Angle				Face Angle			
Berms	No.	Minimum width (m)		Berms	No.	Minimum width (m)	
Slope Surface Cover							
Drainage		Size (mm)	Spacing (m)	Drainage		Size (mm)	Spacing (m)
	Weepholes/ horizontal drains				Weepholes/ horizontal drains		
	Channels : at crest on berms at toe on slope				Channels : at crest		
					Down pipes		
Special measures	Soil Nails	Long Horizontal Drain		Special measures	Soil Nails	Long Horizontal Drain	
	Anchors	Rock Bolts			Anchors	Rock Bolts	
	Reinforced Earth	Buttress Wall			Reinforced Earth	Buttress Wall	
	Remarks :				Remarks :		
		
TYPE AND SIZE OF SERVICES							
On slope :							
.....							
At crest :							
.....							
.....							
Note: (1) Upon request, the Geotechnical Engineering Office can provide a slope or retaining wall reference number if available.							

RECORD OF SLOPE/RETAINING WALL**(SHEET 2 OF 4)**

SLOPE/RETAINING WALL REFERENCE NO.

SLOPE/RETAINING WALL LOCATION (ADDRESS)

INFORMATION ON CONSEQUENCE-TO-LIFE CATEGORY

What facilities will be affected if this slope or retaining wall collapses (e.g. school, market, playground, highway, country park, etc)?

AT CREST (a) Type(s) of facility.....
 (b) Distance(s).....

AT TOE (a) Type(s) of facility.....
 (b) Distance(s).....

Consequence-to-life category of the slope or retaining wall (refer to PNAP 234) :

GENERAL INFORMATION

Date of ground investigation :

Name & Address of Contractor :

Date of construction :

Name & Address of Contractor :

Designed by (Firm) :

As-constructed drawing no.(s) :

Nearest raingauge(s)⁽¹⁾ :**OTHER INFORMATION**

Prescriptive Measures carried out

Type 1 Measures Type 2 Measures Type 3 Measures

Stability Assessment carried out Evidence of checking by GEO

Remarks :

.....

.....

Record sheet prepared by : **Firm :**

Signature : **Date :**

Note: (1) Upon request, the Geotechnical Engineering Office can provide information about the locations of raingauges.

SLOPE/RETAINING WALL RECORD

(SHEET 3 OF 4)

SLOPE/RETAINING WALL REFERENCE NO.

SLOPE/RETAINING WALL LOCATION (ADDRESS)

LOCATION PLAN (with scale) AND SITE PLAN (1:1000)

SLOPE/RETAINING WALL REFERENCE NO.

SLOPE/RETAINING WALL LOCATION (ADDRESS)

RECORD PHOTOGRAPHS (with comments, date and reference numbers)

Note: Add additional record sheets for photographs as necessary.

Data Structure for Registration and Updating of Slope Record in SIS
(Version 1.2)

Record Group	Item	Field Name	Field Type	Field Length	Decimal Place	Data Set
Record of Slope and Retaining Wall	Slope /Retaining Wall Reference No.	FEATURE	Character	13		
	Slope /Retaining Wall Location (Address)	LOCATION	Character	100		
	Map Coordinates (1980 Datum) Easting	EAST	Number	6	0	>800000 and <900000
	Map Coordinates (1980 Datum) Northing	NORTH	Number	6	0	>800000 and <900000
	Toe Elevation (mPD)	TOE_ELV	Number	5	1	> 0
Slope Part Technical Information	Material Description - Material Type	SF_MAT	Character	15		IN ('Soil', 'Rock', 'Soil & Rock')
	Material Description - Geology	SF_GEOLOGY	Character	20		IN ('Colluvium', 'Decomposed volcanic', 'Decomposed granite', 'Other geology')
	Height (m) [Maximum]	SF_HEIGHT	Number	5	1	> 0
	Length (m) [Along its toe]	SF_LENGTH	Number	7	1	> 0
	Slope Angle (deg) [Average]	SF_ANGLE	Number	2	0	> 0 and < 90
	Berms - No.	SF_BERM	Number	2	0	> 0
	Berms - Minimum width (m)	SF_BERMW	Number	3	1	> 0
	Slope Surface Cover Percentage - Bare	SF_BARE	Number	3		>0 and <=100
	Slope Surface Cover Percentage - Chunam	SF_CHUNAM	Number	3		>0 and <=100
	Slope Surface Cover Percentage - Shotcrete	SF_SHOTCRETE	Number	3		>0 and <=100
	Slope Surface Cover Percentage - Vegetated	SF_VEGETATED	Number	3		>0 and <=100
	Slope Surface Cover Percentage - Others	SF_CVR_OTHERS	Number	3		>0 and <=100
	Weepholes Size (mm)	SW_SIZE	Character	10	0	IN (< 30', '31-50', '51-80', '> 80')
	Weepholes Spacing (m)	SW_SPC	Character	20	0	IN ('Occasional', 'Random', '1.9-2.5', '1.4-1.8', '< 1.4')
	Horizontal Drains Size (mm)	SHD_SIZE	Character	10		IN (< 30', '31-50', '51-80', '> 80')
	Horizontal Drains Spacing (m)	SHD_SPC	Character	20		IN ('Occasional', 'Random', '1.9-2.5', '1.4-1.8', '< 1.4')
	Channel at Crest Size (mm)	SU_CREST	Character	10		IN (< 100', '101-150', '151-200', '201-250', '251-300', '>300')
	Channels on Berm Size (mm)	SU_BERM	Character	10		IN (< 100', '101-150', '151-200', '201-250', '251-300', '>300')
	Channels at Toe Size (mm)	SU_TOE	Character	10		IN (< 100', '101-150', '151-200', '201-250', '251-300', '>300')
	Channels on Slope Size (mm)	SU_SLP	Character	10		IN (< 100', '101-150', '151-200', '201-250', '251-300', '>300')
Special Measures - Soil Nails	SM_NAIL	Character	1		IN ('Y','N')	
Special Measures - Anchors	SM_ANCHOR	Character	1		IN ('Y','N')	
Special Measures - Reinforced Earth	SM_EARTH	Character	1		IN ('Y','N')	
Special Measures - Long Horizontal Drains	SM_HORIZD	Character	1		IN ('Y','N')	

Record Group	Item	Field Name	Field Type	Field Length	Decimal Place	Data Set
Slope Part Technical Information	Special Measures - Rock Bolts	SM_BOLTS	Character	1		IN ('Y','N')
	Special Measures - Buttress Walls	SM_BUTTRES S	Character	1		IN ('Y','N')
	Special Measures - Others	SM_OTHER	Character	100		
Wall Part Technical Information	Type of Wall	WF_TYPE	Character	38		IN ('Retaining wall with level platform', 'Wall at crest', 'Wall at toe', 'Wall at mid-slope')
	Wall Material	WF_MATERIA L_TYPE	Character	20		IN('Random rubble', 'Masonry', 'Gabion', 'Concrete', 'Others')
	Height (m) [Maximum]	WF_HEIGHT	Number	5	1	>0
	Length (m) [Along its toe]	WF_LENGTH	Number	7	1	>0
	Face Angle (deg) [Average]	WF_ANGLE	Number	2	0	>0 and <=90
	Berms - No.	WF_BERM	Number	2	0	>0
	Berms - Minimum Width (m)	WF_BERMW	Number	3	1	>0
	Weepholes Size (mm)	WW_SIZE	Character	10		IN (< 30', '31-50', '51-80', '> 80')
	Weepholes Spacing (m)	WW_SPC	Character	20		IN ('Occasional', 'Random', '1.9-2.5', '1.4-1.8', '< 1.4')
	Horizontal Drains Size (mm)	WHD_SIZE	Character	10		IN (< 30', '31-50', '51-80', '> 80')
	Horizontal Drains Spacing (m)	WHD_SPC	Character	20		IN ('Occasional', 'Random', '1.9-2.5', '1.4-1.8', '< 1.4')
	Channel at Crest Size (mm)	WU_CREST	Character	10		IN (< 100', '101-150', '151-200', '201-250', '251-300', '>300')
	Down pipe	WF_PIPE	Character	10		IN (< 100', '101-150', '151-200', '201-250', '251-300', '>300')
	Special Measures - Soil Nails	WM_NAIL	Character	1		IN ('Y','N')
	Special Measures - Anchors	WM_ANCHOR	Character	1		IN ('Y','N')
	Special Measures - Reinforced Earth	WM_EARTH	Character	1		IN ('Y','N')
	Special Measures - Long Horizontal Drains	WM_HORIZD	Character	1		IN ('Y','N')
	Special Measures - Rock Bolts	WM_BOLTS	Character	1		IN ('Y','N')
	Special Measures - Buttress Walls	WM_BUTTRES S	Character	1		IN ('Y','N')
	Special Measures - Others	WM_OTHER	Character	100		
Type and Size of Service	On Slope Surface - Water Main	SS_WM_SIZE	Number	4		>=0
	On Slope Surface - Sewer/ Drain	SS_SD_SIZE	Number	4		>=0
	On Slope Surface - Gas Main	SS_GM_SIZE	Number	4		>=0
	On Slope Surface - Telecom Cable	SS_TC_SIZE	Number	4		>=0
	On Slope Surface - Electricity	SS_E_SIZE	Number	4		>=0
	On Crest - Water Main	CS_WM_SIZE	Number	4		>=0
	On Crest - Sewer/ Drain	CS_SD_SIZE	Number	4		>=0
	On Crest - Gas Main	CS_GM_SIZE	Number	4		>=0
	On Crest - Telecom Cable	CS_TC_SIZE	Number	4		>=0
On Crest - Electricity	CS_E_SIZE	Number	4		>=0	
Information on Consequence-to-life Category	Consequence-to-life category of the slope or retaining wall	CONSEQ_CAT	Character	1		IN ('1','2','3')
	Toe Facility Distance (m)	TOE_DIST	Number	5	1	>=0
	Type of Facility at Toe	TOE_TYPE	Character	35		IN Struct.dbf
	Crest Facility Distance (m)	CREST_DIST	Number	5	1	>=0
	Type of Facility at Crest	CREST_TYPE	Character	35		IN Struct.dbf

Record Group	Item	Field Name	Field Type	Field Length	Decimal Place	Data Set
General Information	Date of Ground Investigation (GI)	GRD_INS_DATE	Date	8		dd/mm/yyyy
	Name & Address of GI Contractor	NAM_ADD_CON1	Character	100		
	Date of Construction	CONSTR_D	Date	8		dd/mm/yyyy
	Name & Address of Contractor	NAM_ADD_CON2	Character	100		
	Designed by (Firm)	DESIGN_BY	Character	100		
	As-constructed drawing no.	AS_CON_DRAW	Character	50		
	Nearest Raingauge	RAINGAUGE	Character	3		
	Other Information - Prescriptive Measures carried out	OI_PMEASU	Character	1		IN ('Y','N')
	Other Information - Type 1 Measures	OI_TYPE_1	Character	1		IN ('Y','N')
	Other Information - Type 2 Measures	OI_TYPE_2	Character	1		IN ('Y','N')
	Other Information - Type 3 Measures	OI_TYPE_3	Character	1		IN ('Y','N')
	Other Information - Stability assessment carried out	OI_SA	Character	1		IN ('Y','N')
	Other Information - Evidence of design acceptance by GEO	OI_CHECKED	Character	6		IN ('Y','N', 'Waived')
	Other Information	OTHER	Character	254		
	Name of person prepared the record sheet	PERSON	Character	20		
	Name of Firm prepared the record sheet	FIRM	Character	50		
	Date of record sheet prepared	PREP_DATE	Date	8		dd/mm/yyyy

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